PROJECT LEAD THE WAY – PRE-ENGINEERING

Indiana State Approved Course Titles and Descriptions

Indiana Department of Education
College and Career Readiness
151 West Ohio Street
Indianapolis, IN 46204

PROJECT LEAD THE WAY - PRE-ENGINEERING

Academic Content Standards and Curriculum Framework defined by Project Lead the Way, Inc.
http://www.pltw.org/curriculum/hs-engineering.html

Teacher Requirements:
http://www.doe.in.gov/educatorlicensing/pdf/AssignmentCode.pdf

AEROSPACE ENGINEERING

4816 *(AE)*

Aerospace Engineering should provide students with the fundamental knowledge and experience to apply mathematical, scientific, and engineering principles to the design, development, and evaluation of aircraft, space vehicles and their operating systems. Emphasis should include investigation and research on flight characteristics, analysis of aerodynamic design, and impact of this technology on the environment. Classroom instruction should provide creative thinking and problem-solving activities using software that allows students to design, test, and evaluate a variety of air and space vehicles, their systems, and launching, guidance and control procedures. Only those schools having a signed agreement with the national Project Lead The Way organization can use this course title.

- Recommended Grade Levels: 11-12
- Recommended Prerequisites: Introduction to Engineering Design and Principles of Engineering
- Credits: A two credit, two semester course
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

BIOTECHNICAL ENGINEERING

4818 *(BTE)*

Biotechnical Engineering should introduce students to the fundamental aspects of biotechnology and the engineering technologies related to this emerging field. Instruction will emphasize how engineering and technology processes can be used to create new products. Engineering principles will be used in conjunction with scientific knowledge to explore and investigate such areas as: development of biomedical devices; pharmaceutical and medical therapies; and agricultural research and development. Students will learn how new products are developed and produced and will have opportunities to discuss the impact of these technological advances on society. Only those schools having a signed agreement with the national Project Lead The Way organization can use this course title.

- Recommended Grade Levels: 11-12
- Recommended Prerequisites: Introduction to Engineering Design and Principles of Engineering
- Credits: A two credit, two semester course
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

CIVIL ENGINEERING AND ARCHITECTURE

4820 *(CEA)*

This course should introduce students to the fundamental design and development aspects of civil engineering and architectural planning activities. Application and design principles will be used in conjunction with mathematical and scientific knowledge. Computer software programs should allow students opportunities to design, simulate, and evaluate the construction of buildings and communities.

During the planning and design phases, instructional emphasis should be placed on related transportation, water resource, and environmental issues. Activities should include the preparation of cost estimates as well as a review of regulatory procedures that would affect the project design. Only those schools having a signed agreement with the national Project Lead The Way organization can use this course title.

- Recommended Grade Levels: 11-12
- Recommended Prerequisites: Introduction to Engineering Design and Principles of Engineering Credits: A two credit, two semester course
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

COMPUTER INTEGRATED MANUFACTURING

4810 *(CIM)*

Computer Integrated Manufacturing is a course that applies principles of rapid prototyping, robotics, and automation. This course builds upon the computer solid modeling skills developed in Introduction of Engineering Design. Students will use computer controlled rapid prototyping and CNC equipment to solve problems by constructing actual models of their three-dimensional designs. Students will also be introduced to the fundamentals of robotics and how this equipment is used in an automated manufacturing environment. Students will evaluate their design solutions using various techniques of analysis and make appropriate modifications before producing their prototypes. Only those schools having a signed agreement with the national Project Lead the Way organization can use this course title. Schools involved in Project Lead the Way should use this course title in lieu of the Technology Education course “Computers in Design and Production Systems.”

- Recommended Grade Levels: 11-12
- Recommended Prerequisites: Introduction to Engineering Design and Principles of Engineering
- Credits: A two credit, two semester course
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

DIGITAL ELECTRONICS

4826 *(DE)*

Digital Electronics Technology is a course of study in applied digital logic that encompasses the design and application of electronic circuits and devices found in video games, watches, calculators, digital cameras, and thousands of other devices. Instruction includes the application of engineering and scientific principles as well as the use of Boolean algebra to solve design problems. Using computer software that reflects current industry standards, activities should provide opportunities for students to design, construct, test, and analyze simple and complex digital circuitry.

- Recommended Grade Levels: 11-12
- Recommended Prerequisites: Introduction to Engineering Design and Principles of Engineering
- Credits: A two credit, two semester course.
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

ENGINEERING DESIGN AND DEVELOPMENT

4828 *(EDD)*

Engineering Design and Development is designed to introduce students to the fundamental aspects of engineering and engineering technology. Instruction will emphasize underlying principles of engineering

processes and the development of three-dimensional solid models. Instructional activities will build skills ranging from sketching simple geometric shapes to applying a solid modeling computer software package. Students will develop critical thinking and problem-solving skills through instructional activities that pose design and application challenges for which they develop solutions. The techniques learned, and equipment used, should be state of the art and reflect equipment and processes currently being used by engineers throughout the United States.

- Recommended Grade Levels: 12
- Recommended Prerequisites: Introduction to Engineering Design and Principles of Engineering
- Credits: A two credit, two semester course.
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

INTRODUCTION TO ENGINEERING DESIGN

4812 *(IED)*

Introduction to Engineering Design is an introductory course which develops student problem solving skills with emphasis placed on the development of three-dimensional solid models. Students will work from sketching simple geometric shapes to applying a solid modeling computer software package. They will learn a problem solving design process and how it is used in industry to manufacture a product. The Computer Aided Design System (CAD) will also be used to analyze and evaluate the product design. The techniques learned, and equipment used, is state of the art and are currently being used by engineers throughout the United States. Only those schools having a signed agreement with the national Project Lead the Way organization can use this course title.

- Recommended Grade Levels: 9-12
- Recommended Prerequisite: Algebra I or concurrently enrolled in Algebra I
- Credits: A two credit, two semester course
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

PRINCIPLES OF ENGINEERING

4814 *(POE)*

Principles of Engineering is a broad-based survey course designed to help students understand the field of engineering and engineering technology and its career possibilities. Students will develop engineering problem solving skills that are involved in postsecondary education programs and engineering careers. They will also learn how engineers address concerns about the social and political consequences of technological change.

- Recommended Grade Levels: 9-10
- Recommended Prerequisites: Introduction to Engineering Design
- Credits: A two credit, two semester course
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas